Compact unit for cost-efficient punch velocity control

Reference No: B76058

CHALLENGE

The mechanical manufacturing of a workpiece consists of different operations. To improve the efficiency of the overall process, these operations are usually executed in parallel. This is realized equipping an upper stage tool with several different active elements. Each of these elements executes a specific operation. The main problem of this approach is, that the optimal operational efficiency of the different active elements is reached at different operational velocities. To optimize the overall process, it is necessary to find a compromise between the different operational velocities.

INNOVATION

This invention consists of a compact displacement transmitter, which allows for tuning the operational speed of the single active elements, so that each of those can operate at its best conditions. This transmitter is based on hydraulic displacement transmission. The transmission ratio can be adjusted by changing the diameter of a large and a small punch. This invention has in particular the following advantages:

- The transmitter can be easily integrated into existing tools;
- The transmitter allows either for an increase or a decrease of the velocity of the active element with respect to the velocity of the upper stage tool;
- All active elements are coupled and act simultaneously on the workpiece although at different velocities;
- Overall, the process becomes more efficient and the quality of the produced workpiece is improved.

COMMERCIAL OPPORTUNITIES

The invention can be applied for industrial stamp operation.

(reference)

(Left) Schematic representation of a stage tool mounting two displacement transmitters. The transmitters reduce the velocity of the active elements with respect to the velocity of the upper stage tool. [Up right] Displacement of the active elements in dependence on the position of the upper plate; the position is indicated by an angle, because the upper plate moves in cycles. All elements move consistently following the same trend with respect to the motion of the upper plate. [Low right] Velocities of the active elements (first derivative of the displacement) in dependence on the position of the upper plate.

REFERENCE:

[1] https://mediatum.ub.tum.de/1400724